NORTHERN CALIFORNIA GEOLOGICAL SOCIETY

Whitewater Rafting Down the American River

Saturday, August 7, 1999

Led by Russ Graymer, U.S. Geological Survey, Menlo Park, CA.

This one-day experience will start west of Lotus (downstream from Sutter's Mill near Coloma) on highway 49 north of Placerville. During the day, we will glide through (and over) the Coloma granite pluton and numerous suspect terrains related to the Nevadan Orogeny. In geology-speak, specifics include the opportunity to observe: debris flows from volcanic seamounts that formed during the Triassic-Jurassic (Mount Ararat terrane); Mesozoic olistostromes (American River Terrane); the Bear Valley Fault Zone including a serpentine melange of the Bear Mountains Ophiolite; and oceanic metavolcanics and upper greenschist to amphibolite-grade metamorphics (French Creek Terrane). In plain English, this means you have the opportunity to: float down the American River, get wet, get some sun, look at some really neat old rocks, go through some rapids, watch some professional armwaving and pontificating, and have one heck of a good time. In universal language-speak, all the gibberish above simply means: Don't miss this one!

Our raft guide for this 12-mile float trip is **All Outdoor Whitewater Rafting**. This company has 35 years of rafting experience and has never unintentionally lost a geologist of any trip. **VERY IMPORTANT!** This trip involves extra logistics, planning, and money so if you want to go, you need to sign up **ASAP!** Don't wait till the last minute! ***The rafting company needs an approximate head count by Friday July 9th!*** There is **some** flexibility for signing up after this date, but please help out by signing up ASAP. Again, Teenagers are invited **IF** accompanied by an adult.

Cost for this adventure is $110.00 (cheap!). This includes transportation, rafting costs, barbecue lunch, beverages, and our standard California breakfast (i.e. coffee/juice & donuts). Appropriate dress is either old sneakers, shorts, sunglasses, and sunscreen (or a formal tuxedo). *For more info, visit All Outdoor Whitewater Rafting's web page at **www.aorafting.com** and click on the South Fork American River link.*

Meeting Locations and Times: **San Ramon at 6:30 a.m. (We must depart by 7:00 a.m.):** 2682 Bishop Drive, Bishop Ranch 2, in San Ramon (across from Chevron Park). **Directions:** Exit I-680 at Bollinger Canyon and go east one block to the stoplight at Chevron Park Circle West/Sunset. Turn left onto Sunset and right into the parking lot of Bishop Ranch 2 at the next stoplight. Make a sharp right as you enter the parking lot and then a sharp left as the lot continues around the front of the building, which faces Bollinger Canyon Road. If you are confused or not quite sure which way is east, call **Dan Day** at **(925) 294-7530** for better directions.

Camp Lotus campground at 9:45 am sharp. Camp Lotus is located off Highway 49 just west of Coloma and Sutter's Mill about 10 miles north of Placerville. For those so inclined, there is camping at Camp Lotus, Bed & Breakfast Inns at Coloma, and Hotels & Motels in Placerville. Again the All Outdoor Whitewater Rafting web page has more info (and better directions).

IMPORTANT: If you will **NOT** be joining the NCGS Van Caravan, please indicate so on your registration form. If you have **ANY** questions, don't hesitate to call **Bill Howell** at **(925) 484-3571**.

Cost: **$110 per person** ***A barbecue lunch will be provided by All Outdoor Whitewater Rafting.*** **Please B.Y.O.B.**

********** REGISTRATION FORM **********

Name _____

Address (Street/City/Zip) _____

Phone (day) _____ **Phone (evening)** _____

E-mail or Fax No. _____

Please check if you will NOT be joining the NCGS Van Caravan from San Ramon _____

Please write a check to NCGS and mail it with the completed registration form to:
Bill Howell, 6651 Alisal Street, Pleasanton CA. 94566

If you have any questions or need more information, call Bill at **(925) 484-3571** or phone/fax him at **(925) 484-3111**

Computer Modeling of Earthquake Ground Motion Premiered at May 12th Meeting

Those who attended the May 12th NCGS meeting in Orinda were treated to a very visual display of seismology in action. Our guest speaker was **Dr. Douglas Dreger** of the U.C. Berkeley Seismological Laboratory. His talk ***"Predicting the Strong Shaking of the Next Hayward Fault Earthquake"*** addressed studies he and his fellow researchers are conducting to model the seismic waves and strong motion fields produced by earthquake events. Doug is a recent (1992) Caltech graduate who has been affiliated with the Berkeley Seismological Lab since 1993, and an Assistant Professor in the U.C. Berkeley Department of Geology and Geophysics. His research into strong motion activity associated with earthquakes has been driven by the aftermath of the Loma Prieta, Northridge (Southern California), and Kobe, Japan, earthquakes. Although earthquake prediction remains an elusive problem, the preparation of our urban infrastructures for events in the future—crisis response units; public preparedness; structural design; gas, water, and electrical utility protection---can be accurately modeled using past seismologic data and today's advanced computing capabilities.

The Kobe earthquake has been recognized as a possible Hayward Fault scenario, and triggered a fire storm and building damage that claimed over 5,000 lives. Structural design in the greater Kobe area is very similar to the East Bay, with its mixture of seismically sound modern construction and relatively vulnerable buildings and homes from the rapid growth post-World War II era. Seismic monitoring of the 1992 Landers Earthquake in Southern California yielded fault normal accelerations of 0.8G, or 80% the earth's gravitational acceleration. There can also be permanent displacement of objects due to ground motion that causes them to behave differently than the forces they were designed for. The 1989 Loma Prieta Earthquake displayed strong localized ground motion at great distances from the epicenter that caused damage in the Marina district of San Francisco, to the Bay Bridge, and to the Cypress Freeway in Oakland. Building and freeway collapses during the Northridge and Kobe events were attributed to large velocity pulses and related intense ground movement.

The first stage of the modeling process is source modeling by Doppler techniques. Wave front propagation along the fault plane is systematically distorted in a classical Doppler fashion (analogous to the change in pitch of a train whistle as the source approaches or moves away from a fixed observer) as the rupture event moves along the fault plane. The generated wavefront is then modified by reflection-refraction-diffraction by various subterranean structures and fault planes as it moves toward the surface. Analysis of data from seismic stations in the study areas allowed Doug's team to reconstruct fault rupturing events over time, and model waveforms generated by discrete seismic events. Doug demonstrated this technique using data from the Northridge quake, which gave a peak slip of 330 cm., a total duration of 9 seconds, and occurred along a 30 km. by 40 km. sized fault plane. The rupturing began at a depth of 18 km. and died out about 8 km. beneath the city of Northridge. The colorized computer simulation of the rupturing event modeled from the seismic data clearly provided a dramatic visual event that clearly illustrated the propagation of fault plane failure that created the earthquake. Changes in the rupturing process in terms of failure location and duration reflected differences in physical characteristics of the source area such a pore pressure, lithology, and stress distribution along the fault plane. The rupture process and the propagation of the waveforms defined by the lithology and structure of the crust have a strong influence on earthquake wave propagation. These factors must be understood to properly model strong ground motion.

Doug and his colleagues have been working to develop a 3-dimensional representation of crustal structure in the Bay Area to systematically evaluate its effects on producing strong ground motion. Their model uses an elastic finite difference mathematical algorithm written by Dr. Shawn Larsen of the Lawrence Livermore National Laboratory that uses 46 million points spaced at 250 meter intervals to simulate synthetic waveforms accurate to a high end frequency of 0.5 Hertz. This modeling requires P and S wave velocities and density to be prescribed at each point, and then the complex waveform calculations are performed on the parallel Meiko CS-2 supercomputers at Lawrence Livermore National Laboratory. Each calculation takes up 2 Gigabytes of memory and needs 8 hours of processing time. Proper modeling of the waveforms require a maximum frequency of 2 Hertz, which will consume 10 times the memory of this model and necessitate an even more formidable computer system. The real challenge to this program, however, is not computer capacity, but the need for accurate geological information to incorporate into the computational algorithms. This limited information is paramount to accurately modeling the strong motion field given the appropriate seismic data. The crustal structure data in essence controls the output of the waveform modeling program, and must be accurately known if the model is to correctly describe ground shaking caused by a given rupturing event. Doug displayed various crustal cross sections used for these complex simulations.

The most exciting parts of the presentation were computer simulations of the Loma Prieta earthquake event and a hypothetical M7.1 event on the Hayward Fault. Doug's colorized video of strong wave activity created by the 1989 event clearly showed the refraction of wave energy by the San Andreas Fault into the East Bay, and 2 to 4-fold waveform amplification by the Livermore Valley basin and San Pablo Bay sediments. The hypothetical Hayward Fault event produced different effects depending on the direction of rupture propagation along the fault plane. A northward propagation caused prolonged activity in the San Pablo Bay area; a southward trending rupture event triggered strong amplification and "echoing" in the Santa Clara and Livermore valleys; and the worst scenario—a bilateral rupture—agitated all three basins. The enhancement of seismic vibrations is in part caused by reflection of waves within these basins and explains some of the intensified readings registered in these regions during the Loma Prieta event. Doug's short but fascinating "seismo-cartoons" clearly illustrated his points and provided a visual means of understanding how seismic energy is transmitted through the Greater Bay Area. Doug emphasized that this is only a preliminary model, and that there are some areas that do not respond properly when compared with the measured seismic data. He feels that refined geological information on crustal structure and lithology in these areas, for example the Salinas Valley, will allow researchers to match simulated earth motion with monitored data for actual seismic events. He commented that modeling will become more accurate as denser seismometer arrays, improved geological information, and a better understanding of earthquake rupturing events become available. Future plans involve modeling seismic events on other major Bay Area features like the Calaveras Fault.

Dr. Dreger's demonstration clearly illustrated the power of this modeling technique as a tool for determining earthquake risk and for simulating various seismic scenarios and how each would affect the Bay Area. The NCGS was quite fortunate to have Doug preview this exciting research for its members. The visual effects of the modeling program alone were well worth coming to see and to marvel at the amazing capabilities of today's computer software.

NORTHERN CALIFORNIA GEOLOGICAL SOCIETY

Del Puerto Canyon Field Trip

Saturday, August 21, 1999

Led by Ron Crane, Consultant, and Sandy Figuers, Norfleet Consultants

This trip will acquaint the geologist with the central portion of the Diablo Range. The geology includes Quaternary through Jurassic rocks, Cretaceous deep sea fans, olistostromes, a siliceous volcanic sequence of Jurassic age, the Jurassic Lotta Creek tuff, chert, serpentine, gabbro, peridotite, greenstones, and early Cretaceous metamorphic rocks. The structural/tectonic setting involves a thrusted anticline of the Burnt Hills terrane, thrusting and folding of early Cretaceous rocks, and an east-vergent wedge which has raised the western boundary of the Central Valley. The trip will proceed from conglomerates derived from a western highland, through the Calaveras zone and across to the Central Valley before returning down the trace of the Greenville Fault to Livermore.

Time: **Saturday, August 21, 1999**

Departure: **San Ramon:** 2682 Bishop Drive, San Ramon at **7:30 a.m. (see directions below)**

OR

Alum Rock Park, San Jose at **8:30 a.m. :** Located east of San Jose on Highway 130 (Mt. Hamilton Rd.). Meet in the large parking at the entrance to Alum Rock Park.

Directions: ***New & Improved meeting Place:*** Because so many of our geologist members look like terrorists, we have decided to give the Chevron Security Department a break and will now be meeting at 2682 Bishop Drive in San Ramon (across from Chevron Park). **Directions:** Exit I-680 at Bollinger Canyon and go east one block to the stoplight at Chevron Park Circle West/Sunset. Turn left onto Sunset and right into the parking lot of Bishop Ranch 2 at the next stoplight. Make a sharp right as you enter the parking lot and then a sharp left as the lot continues around the front of the building, which faces Bollinger Canyon Road. If you are confused or not quite sure which way is east, call Dan Day at (925) 294-7530 for better directions.

Cost: **$20 for members; $30 for nonmembers.** This price includes transportation, pastries, lunch, and refreshments.

********** **REGISTRATION FORM** **********

Name _____

Address (Street/City/Zip) _____

Phone (day) _____ **Phone (evening)** _____

E-mail or Fax No. _____

Indicate if you are a nonmember (cost is $30) _____

Dead Animal Parts (a.k.a. Regular Lunch) _____ **Vegetarian Lunch** _____ (Please check one)

I am willing to drive my van or SUV on this trip _____ (check if YES) Mileage will be paid by the NCGS

Please write a check to the NCGS and mail it with the completed registration form to:

Bill Howell, 6651 Alisal Street, Pleasanton CA. 94566

If you have any questions or need additional information, call Bill at **(925) 484-3571** or Fax him at **(925) 484-3111**

Please give us some feedback of the other field trips you might attend during 1999 (this will not be considered a commitment). Please indicate your level of interest using the following code:

y = yes, am definitely interested; **m** = maybe; **n (or blank)** = no thank you.

Vallecitos Syncline: _____ Bay Area Volcanics: _____ Pinnacles National Monument: _____ Long Valley Caldera: _____

Pigeon Point Turbidites: _____ Vasco Caves: _____

THE IRS v. THE NCGS (Part II - The Rest of the Story)

When we last left the illustrious Board of the NCGS, they had narrowly missed an embarrassing personal hygiene crisis by making a lame promise to the IRS. As you may recall (depending on whether you even read the June NCGS newsletter), the Board's biogeochemist claimed that NCGS could solve our nation's MTBE groundwater contamination problem.

After using the bathroom and then "liberating" the remaining bottles of beer from the Research Department, some members began to have doubts as to whether the NCGS could actually solve such a perplexing environmental problem. I mean, everyone knows how biogeochemist's get when they've had too many Pilsners. They're almost as bad as seismologists. But at the time, we all needed to go to the bathroom really bad and it was the only way out. As a footnote, the NCGS Chief of Logistics and Contingency Planning has since required that bedpans now be provided at all meetings to prevent the Board from making such rash commitments in the future.

So, an emergency meeting was held to figure out how to save the NCGS beer fund within the 30 days allocated by the IRS. At this meeting, we got right down to work by immediately bickering and squabbling and blaming Professor Sullivan for getting us into another fine mess. As always, good 'ol Ray "the arm-waver" Sullivan, tried to be helpful by asking if we would all like to step out for a good Welsh Ale. After due consideration, we were ready to go when the NCGS treasurer Thelma "the tee-totaler" Dana began wagging her finger and scolded us that this was exactly how we got into trouble in the first place. She then added that we were behaving like a bunch of children and that we should just sit down and clean up our mess! (Dana knows how to keep us focused because she used to be a kindergarten teacher.)

It was obviously time for an executive decision on whether we should go with Dr. Sullivan or deal with the IRS. So our president, Dan Day, stood up, cleared his throat and rolled up his sleeves to signify that we should all get down to work. When he did this, however, it exposed two very large tatoos, one on each arm, that both said "MOM"; so he un-rolled his sleeves and sat back down. Then, with a very regal sweep of his hand, he ordered the NCGS kitchen staff to bring us pizzas and two cases of beer. Satisfied with his efforts, he confidently asked if anybody had even the slightest idea about what to do with the IRS.

One member proposed that we send the IRS a case of Dr. Wakabayashi's home brew, but as we weren't yet ready to resort to panic, this motion quickly died. Then another member asked just what exactly the initials MTBE stood for. The Board's chemist dryly replied (with that know-it-all-attitude Chemists often have), that MTBE was the chemical abbreviation for Methyl-Tert-Butyl-Ether. The Board's environmental consultant, however, quickly corrected him and said that it meant "Money To Be Earned". Then, of course, they started squabbling about who was right. Our president finally ended the argument by announcing that since it was easier to pronounce, the Board would go with the environmental consultant's definition. Although the chemist looked disgusted, we're all used to it since everyone knows what poor sports chemists can be. At this point, however, the Board's biogeochemist, who had been distracted from the conversation by trying to defend himself against a group who was blaming him for our not being able to go with Dr. Sullivan, stood up and said that the solution to the MTBE groundwater problem was actually very simple.

He explained that MTBE was an environmental problem because it doesn't adsorb (attach) very efficiently to soil particles and because it is extremely soluble in water. He added that the only substance that MTBE is more soluble in than water, is gasoline. Then he explained that since the technology exists to capture and remove gasoline from groundwater, the solution was simply to pump gas into the groundwater at MTBE sites. After the MTBE resorbs back into the gasoline, it is a simple matter to pump out the gasoline. **(Beauty eh?)**

At this, the Board's environmental consultant looked crushed. He had just purchased a new boat, a new car, and a new house, and suddenly realized that if this solution was adopted, he wouldn't be able to pay for them. Defensively, he exclaimed, "But the EPA will never go for it!", to which the Board's regulatory advisor said "Bull-something or other" (this is a family newsletter you know). The regulatory advisor then pointed out that it was the EPA themselves which approved the use of MTBE before the toxicological studies were even completed, and that the EPA was the very group who created a multi-billion dollar environmental industry by applying drinking water standards to first-encountered water bearing zones which contain water that no one would drink in the first place! He then confidently asserted that the biogeochemist's idea was right in line with way the EPA does things. He also added that the idea of the EPA promulgating a clean-up method for a contaminant problem that they created, and which involved injecting gasoline into groundwater, is an exquisite example of poetic justice. In short, it was the perfect solution. The Board's geophysicist then stood up to state that both the physics and the geochemistry behind the idea were solid. The Board's mathematician then ended the debate by declaring that the solution was not only feasible and reasonable, but that it was **elegant** which, as everyone knows, is the ultimate compliment any solution can hope to attain.

Since the logic of the biogeochemist's solution was irrefutable, there was nothing more to discuss. So, we voted on the motion and it passed unanimously. With that out of the way, we got back to important stuff like ordering Y2K-EOW Crisis equipment from a volcanology-supply catalog. (You can rest assured that when the Y2K comes and the earth stops spinning, we will be prepared.)

Anyway, all's well that ends well. We sent our report in to the IRS and haven't heard back from them since. Professor Sullivan wanted to celebrate and asked if we would all like to step out for a good Welsh ale. We, of course, said, "Hell Yes!", but as we got up to go, Sandy Kubal, the official NCGS "Mom" **(see related article, this issue)** reminded us that the government of Wales had specifically banned the NCGS Board from ever again setting foot in their country, and that the IRS had canceled the NCGS credit card. She then said, "You guys are just a bunch of little kids!". To which we replied, "No, Sandy, we're geologists!". To which she replied, "Same thing!". Well, what could we say. When you're pegged, you're pegged.

And now you know ... the rest of the story.

*** NCGS FIELD TRIP AWARDS ***

As introduced in the June Newsletter, NCGS is now recognizing the vast distances (and lack of common sense) that some members will travel to attend our field trips. As previously mentioned, the reward is one free beer redeemable at any future NCGS lecture or field trip. There are two winners this month (*) because we couldn't determine which one is further away. Ron Crane was in charge of figuring this out, but as we all learned on the Ohlone Wilderness trip, Ron's not real good at reading road maps. It's not his fault tho, it's just that he's spent so much time reading geology maps that he interprets all those black lines on a road map as fault contacts.

NCGS Field Trip	Winner
Ohlone Wilderness (1)	Steve Carter, GeoStrategies, Inc. - Fair Oaks, CA
	Ed Simonis, Fluor Daniel GTI, Inc. - Carmichael, CA
Pleasanton Ridge	Ms. Pat Anderson, RWQCB-Central Region - Sacramento, CA
Mission Peak	Mr. Mike Hart, Engineering Geologist - **San Diego**, CA

(1) Note: There may be a third winner, but we're still checking it out. Alan Haight claims to come to our field trips from **Sunriver, Oregon!** The problem is that we know Al and believe him to be a lot smarter than this (in spite of what his mother says). We're not suggesting (yet) that Al is making this up just to get a free beer, we're just saying we need confirmation that he actually would spend over $100 in air fare to go on a $20 field trip.

*** ANNOUNCEMENT OF NCGS "HONORARY" BOARD POSITIONS ***

As a result of the recent IRS v. NCGS debacle **(see related article, this issue and June 1999 NCGS newsletter)** the IRS has determined that a new NCGS Board position is warranted. The specific IRS requirement is for the official position of NCGS "Mom". After careful review of all questionnaire applications submitted for this position **(see related article, June 1999 NCGS newsletter)** it has been awarded to **Sandy Kubal.** Sandy has a BS degree (very important to the Board), likes geology and getting outdoors, and has looked at a rock at least once. With an impressive score of 165, Sandy is more than qualified to become a Board member. Her official duties are to try as best she can to keep us in line, AND to bring bandages to all future field trips and Board meetings. Welcome Aboard Sandy !!!

Another Board position has also been created. Once again, **Sherb Brown** was selected to serve as the Board's official Reprobate per Webster's definition 2b (i.e. morally abandoned: DEPRAVED). In filling this position, the Board recognizes that, while there are numerous qualified candidates among our membership, Sherb is not only the master we have all learned to look up to, he also had the highest score on the qualifications questionnaire for this position. Bill Howell came in a very close second, but unfortunately, his college degree put him 5 points behind Sherb. All candidates are encouraged to try a little harder during 1999, and we wish them the best of luck in next year's election (assuming the earth abides the Y2K).

NCGS Spring/Fall 1999 Calendar

Please note that some of the agenda topics below are tentative and may be subject to change

August 7	Russ Graymer, USGS	***River Rafting and Geology on the South Fork of the American River*** (see trip flier)
August 21	Ron Crane	***Del Puerto Canyon Field Trip*** (see trip flier)
Sept. 8	Dr. David L. Jones	***Tectonostratigraphic Terrane Analysis in California Geology: History and Future Trends***
September*	Mel Erskine	***Vallecitos Syncline Field Trip*** (see trip list)
October*	Andrei Sarna-Wojcicki	***Volcanics of the Bay Area Region Field Trip*** (see trip list)
Oct. 13	Dr. Ben Santer Lawrence Livermore Lab *1998 McArthur Grant Winner*	***Global Climate Change: Natural or Human-Induced?***
Nov. 10	Richard Blake	***Evidence of an Ancient Asteroid Impact Scar in the Sacramento Valley Area, California***

*Dates and specific titles to be announced

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Danville, CA 94506-1130